

CLAIMS:

1. A method for producing one or more biocatalysts or a combinatorial array of biocatalysts comprising the step of:

5 a) providing a host cell;
 b) recombining at least two biotransformation genes for modifying a chemical substrate into the host cell;
 c) thereby producing at least one recombinant strain comprising a biocatalysts.

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15 2. The method according to claim 1 wherein said at least two biotransformation genes introduce two different chemical functional groups, at least one of the at least two chemical functional groups selected from the group selected from carbon to carbon bonds, hydroxylation, halogenation, cycloaddition, and amination.

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20 3. The method according to claim 1 wherein said biotransformation genes modify functional groups according to reactions selected from the group selected of

 i. reduction;
 ii. oxidation;
 iii. hydrolysis;
 iv. replacement;
 v. ring cyclization;
 vi. isomerization;
 vii. epimerization; and
 viii. dealkylation.

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30 4. The method according to claim 3 wherein the reactions are selected from the group consisting of:

 i. reduction of carboxylic acids, aldehydes, and ketones;
 ii. oxidation of alcohols, sulfites, amino groups, and thiols;
 iii. hydrolysis of nitriles;

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iv. replacement of amino groups with hydroxyl groups;

5. The method according to claim 1 wherein said biotransformation genes provide functional group addition of groups capable of providing catalysis for processes selected from the group consisting of acylation, glycosylation, amidation, phosphorylation, and alkyl transfer.

10 6. The method according to claim 1 wherein said biotransformation genes are derived from whole cells endowed with biotransformation ability as a result of genetic recombination and *in vivo* expression from one or both of constitutive promoter(s) and inducible promoter(s) to create whole-cell biocatalysts.

15 7. The method according to claim 2 wherein said biotransformation genes are derived from whole cells endowed with biotransformation ability as a result of genetic recombination and *in vivo* expression from one or both of constitutive promoter(s) and inducible promoter(s) to create whole-cell biocatalysts.

20 8. The method according to claim 3 wherein said biotransformation genes are derived from whole cells endowed with biotransformation ability as a result of genetic recombination and *in vivo* expression from one or both of constitutive promoter(s) and inducible promoter(s) to create whole-cell biocatalysts.

25 9. The method according to claim 4 wherein said biotransformation genes are derived from whole cells endowed with biotransformation ability as a result of genetic recombination and *in vivo* expression from one or both of constitutive promoter(s) and inducible promoter(s) to create whole-cell biocatalysts.

10. A method for the screening of cells having at least two distinct biotransforming catalysts combined therein, the method selected from the group consisting of:

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- a. providing multiple wells, each of the multiple wells containing cells having at least two distinct biotransforming catalysts combined therein; and
- b. providing multiple wells, each of the wells containing different cells having at least two distinct biotransforming catalysts combined therein;

then allowing cells within the well to catalyze a reaction with a compound within each well, and analyzing the results of any reactions within each well to determine any functional activity of cells within each well.

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11. The method of claim 10 wherein each of the multiple wells contain similar cells having at least two distinct biotransforming catalysts combined therein and different compounds are added to at least some of the multiple wells, and analyzing the results of any reactions within each well to determine any functional activity of cells within each well.

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12. The method of claim 10 wherein each of the multiple wells contain different cells having at least two distinct biotransforming catalysts combined therein and similar compounds are added to at least some of the multiple wells, and analyzing the results of any reactions within each well to determine any functional activity of cells within each well.

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13. The method of claim 10 wherein at least 12 wells are used as the multiple wells.

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14. The method of claim 10 wherein at least 20 wells are used as the multiple wells.

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15. The method of claim 10 wherein at least 40 wells are used as the multiple wells.

16. The method of claim 10 wherein at least 90 wells are used as the multiple wells.

5 17. A method for producing a combinatorial array of biocatalysts comprising the steps of:

- 10 a) providing a host cell;
- b) recombining one biotransformation gene for modifying a chemical substrate into the host cell;
- c) thereby producing at least one recombinant strain comprising a biocatalyst;
- d) then inserting the at least one recombinant strain comprising a biocatalyst into at least two sections of an array of biocatalysts.

15 18. The method according to claim 17 wherein said at least one biotransformation gene introduces a chemical functional group selected from the group selected from carbon to carbon bonds, hydroxylation, halogenation, cycloaddition, and amination.

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